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ABSTRACT

From six institutions in the Illinois Department of Corrections school district, 359 adult male inmates served as subjects for this research evaluation of basic skills. Three groups were in traditional self-paced instruction, and the other three groups were in Program Logic for Automated Training Operations (PLATO) computer managed instruction (CMI). Treatment effects were measured on the Test of Adult Basic Education and the Tennessee Self-Concept Scale. Significant pretest to posttest gains were found for all students in language, mathematics, and reading. Results may have been influenced by the loss of more than half the sample between pretests and posttests because of inmate mobility. The results showed that evidently no simple way exists to predict which students will gain the most from either classroom or CMI instruction, given information about the student's age, ethnicity, type of sentence, and security level of his institution. Also, measuring gains is difficult. Finally, it was determined that further research is needed to understand how and why the two instructional delivery systems worked and, if possible, to determine which method works best for which individual. (Author/KC)

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Evaluation Research in Basic Skills with Incarcerated Adults

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Abstract

Three hundred fifty nine adult male inmates from six institutions in the Illinois Department of Corrections school district served as subjects for this research evaluation of Basic Skills. Three groups were in traditional self-paced instruction, and the other three groups were in PLATO Computer Managed Instruction. Treatment effects were measured on the Test of Adult Basic Education and the Tennessee Self-Concept Scale. Significant pretest to posttest gains were found for all students in language, math, and reading. Results are discussed in terms of the lack of predictable gain when age, ethnicity, type of sentence, and institutional level are known, the complex challenges facing adult educators, and the difficulty measuring the effects of these institutional educational programs.

The Bureau of Prisons in a report to Attorney General William French Smith (The New York Times, July 8, 1982) reports approximately 323,000 prison inmates in state correctional facilities, a rise of about fifty-five per cent since 1975. The report focuses upon the desireability of providing work experiences for inmates and the difficulty implementing the programs. Some of the difficulties stem from irregular prison routines. Inmates are often called away from assignments for counseling, visitations, security checks, showers, or commissary. Yet the need to develop motivating programs to prepare inmates to rejoin the public sector is seen as high priority by the General Accounting Office. In fact, the Director of the Bureau of Prisons has been ordered to develop and monitor fully staffed inmate programs and to disseminate the results of the most successful studies to all prisons.

The legislature for the State of Illinois considered the part that education must play in its correctional programs when it created School District 428, the prison school district, in 1972. This district consolidates the schools in the twenty-one correctional institutions and places them under the direction of a School Board and a Superintendent of Schools. The central administrators espouse sequential programs throughout the district to provide everything from general education programs such as Adult Basic Education (ABE) to college degree programs and a variety of vocational programs, making educational programs available to all of the 14,300 males incarcerated in the State of Illinois. In several institutions, inmates must achieve a predetermined score on a standardized test in reading and math before acceptance into selected vocational classes. Illinois is one of about half a dozen states to have a school district operating the schools in its correctional facilities.

Several recent articles (Keilitz & Miller, 1980; Chassin & Young, 1981; Rogers, 1981; and Tidwell, 1981) present data to document the relationship between school failure, susceptibility to crime, criminal history, low socio economic status, the lack of a cohesive family, unproductive use of leisure time, and problems at school. Others document the influence of single parent households, large numbers of siblings (Boisvert & Wells, 1980), low self-esteem (Mann, 1981), and the staggering fact that 90 per cent of the adults in federal prisons have not completed high school and are functionally illiterate (Martin, 1981). From these correlational studies, a prototype of the incarcerated American male emerges in which the prevalence of low educational performance is clearly evident.

Few intervention studies exist to demonstrate successful programs or practices to explore the potential of illiterate adults, much less incarcerated adults. Some data exist from programs after release (Piliavin & Gartner, 1981; Tidwell, 1981), but these focus primarily upon how to support and monitor ex-offenders to prevent recidivism. A primary reason why few intervention programs exist today is that little is understood about teaching adults who have compounded academic and societal failure.

Most remedial curricula either assume the student simply needs (a) an accelerated version of a traditional developmental curriculum (such as Cracking the Code, SRA, 1968), (b) material to draw upon their life experiences (Clark, 1982), or (c) motivational tools to tap their reserved skills (Bryant et al., 1981; Taylor, 1982). Clear exceptions are the Direct Instruction materials (Engelmann et al., 1980, 1981) that assume that remedial students will benefit little from a rehash of developmental approaches. These materials are designed to extinguish mislearning while teaching a consistent decoding strategy, reading comprehension, and computation.

Still others are hopeful that computer-assisted instruction will prove successful with students who have failed in other settings (McCann, 1981), learning disabled students (Watkins & Webb, 1981), or situations where an individualized approach makes a great deal of common sense (Stevens, 1981; Barrett & Hannafin, 1982). Several recent works (Grinstein & Yarmish, 1981; Lautsch, 1981) have explored such things as the myths and realities associated with computers in education, how computers "should" be used in schools (Stewart, 1981), and how they are being used (Lautsch, 1981). One experimental study, (Thorkildsen, Note 1) reporting instructional design and achievement results, found that when teaching time was held constant, the students receiving the pencil and paper tasks had superior performance to the students receiving the same instruction on a computer.

In order to advance the research base of instructional applications of computers, the federal government is in the process of commissioning a two-year study to explore the major aspects of the use of computers in education (Note 2). The Request for Proposals (NIE-R-82-0011) reports the growing enthusiasm for the application of computers in education and states that, "we are at a critical stage where some of the assumptions behind the enthusiasm should be tested, less we find ourselves in a full-fledged educational revolution built upon unsound foundations and leading to further disappointment with the quality and value of the education students are receiving." (p. 1).

The use of computers for adult education, especially education for incarcerated adults, does seem particularly appropriate. A Computer Managed Instruction implementation allows students to progress at individual rates, while working independently. Students who have failed in traditional classrooms may feel more positively about a non-judgmental

method of instruction (Siegal, 1978) than traditional instruction, though in fact somewhat the opposite was found by Saracho (1982) when working with elementary school children. She found that the students who were not working with the computers felt more positive about computers than the students who were assigned to the computers.

The school district for the Illinois Department of Corrections provides two approaches for students performing above the Adult Basic Education (ABE) level but below the high school equivalency (GED) level. One of these approaches is best described as "traditional." A teacher (and perhaps an inmate aide) is assigned to a class of eight to twenty for approximately two and a half hours each day. Student assignment to these classrooms is determined by reading and math scores on the Test of Adult Basic Education, the TABE, (Tiegs & Clark, 1976) and the judgment of the school principals.

Teachers give students individual assignments from a variety of subject-specific materials such as Steck Vaughn Language (Bryant & Hegepeth, 1978) or Cambridge Mathematics (Howett, 1980). Students then usually work independently as the teacher monitors their progress and makes additional assignments. Students' progress is compared to a sequence of instructional objectives recently prepared by a committee of teachers and administrators from the Illinois Department of Corrections (Core Curriculum, Adult Division, 1981).

In contrast to the traditional classrooms, six regular correctional institutions and one psychiatric treatment center have PLATO[R1] Computer Managed Instruction (CMI) in their pre-GED classrooms. In the institutions where CMI classrooms coexist with traditional classrooms, the principal decides which students are assigned to which type of classroom.

The PLATO/CMI classrooms are staffed by a teacher and an inmate aide, and at most of these institutions, the students attend class for about two and a half hours each day. The PLATO/CMI program provides curricula in reading, language, and math. The program involves a management system of tests and instructional lessons for each of the three strands (reading, language, and math). Students are expected to work on assigned offline materials as well. The curricula are mastery-based, and the teacher or inmate aide can check a student's progress in each strand online at any time.

To date, four research studies (Murphy & Appel, 1977; Osin, Note 3; Saracho, 1982; Torkildsen, Note 1) have compared students in traditional classrooms to those receiving roughly comparable instruction in a computer-managed instructional setting. These studies report mixed results. Murphy and Appel (1977) found no difference in academic achievement for students working on PLATO, while Thorkildsen (Note 1) found higher performance for the traditional group. On the other hand, Osin's (1980) study shows dramatic student achievement gains for disadvantaged Israeli students working on computers. In her study, Saracho (1982) found greater gains for the CMI students and more positive feelings about computers from the students in the traditional classrooms. However, it is difficult to generalize from these four studies ranging from elementary school children to retarded student to work with an adult (and incarcerated) population.

Purpose of the Study

The purpose of this study is to answer three research questions. First, are the incarcerated adult students in all of the pre-GED programs

making significant gains in reading and math? Second, are the students in the PLATO/CMI and traditional classrooms making comparable achievement gains? And, third, can the students' age, ethnicity, type of criminal sentence, or the security level of their institution be used to predict their achievement gains? This evaluation research is the first systematic attempt to evaluate the Department of Corrections pre-GED educational programs for the traditional and CMI classrooms. Given the percentage of incarcerated adults below high school equivalency, and the well-documented correlations of unsuccessful school achievement with a number of adult problems (Beck & Muia, 1980; Felice, 1981), there is a strong need to develop and evaluate successful practices in adult education, particularly for incarcerated minorities.

Methodology

Subjects and Settings

Six correctional institutions served as sites for this study. Three institutions were using the PLATO/CMI program, while the other three institutions used more traditional, though self-paced programs. The institutions were matched so that there was one maximum security and two medium security institutions with each type of instructional program. Matched security levels were important because although the structure of the educational programs is virtually the same at all institutions, there are many institutional differences between maximum security and medium security units. Yet, the average length of stay for an individual varies little from one security level to another, and most inmates are assigned to a maximum security unit immediately after sentencing and then "moved through" the system on the basis of their behavior during incarceration.

There were two maximum security institutions using PLATO/CMI to select from for the study. The choice was made to select the older, larger institution. There were also two maximum security units to select from for contrast sites, and the one most (e.g., similar educational program, type of criminal, etc.) like the PLATO/CMI maximum security prison was selected. Similar criteria governed the selection of the four medium security units. Matches were then made for two PLATO/CMI and two contrast medium security institutions.

The principals at each institutional school assigned the students to classrooms. The PLATO/CMI students scored approximately 6.0 in Total Reading on the Test of Adult Basic Education, the TABE, (Tiegs & Clark, 1976), before entering the program. A similar criterion was used in the traditional classes for pre-GED (Middle School) students, although some students entered these respective middle school program reading below 6.0. In the two PLATO/CMI medium secruity sites, the principals determined if students went into the traditional or PLATO/CMI classes. Sometimes these decisions were made on the basis of available space in the classrooms, and at other times factors such as the need to separate groups of students, or students' conflicting work assignments influenced the decisions.

At each site, the students were paid to attend school. All inmates are paid varying amounts each month for their institutional work assignments (kitchen, school, laundry, etc.). They could earn between $15 and $55 a month, depending upon the value of the work assignment to the institution. School is, however, the second lowest-paying assignment that inmates have ($17.00 average per month), so one can assume that the students who choose to go to school are somewhat motivated to be there.

It is also doubtful that there is much prestige gleaned from being a student.

All students were male, as there is no PLATO/CMI implementation at the state women's prison. At the beginning of the study there were 153 students in the traditional classes and 207 students in the PLATO/CMI classes. Approximately 70 per cent of the students in both instructional groups were minorities with an average age of 25 years. Eighty-six per cent of the students were incarcerated with determinant sentences. Demographic data for all of the participates in the study are presented in Table 1.

Insert Table 1

Criterion Measures

The TABE. Two instruments were used as criterion measures in this study. The TABE was used to measure Total Reading, Total Math, and for the PLATO students, Total Language performance (because the language component was undergoing revision as new PLATO language lessons were added, the study focused upon reading and math). This test has demonstrated test-retest reliability above .80, and a predictive validity of .56 to the Test of General Educational Development (the GED). The TABE is an adaptation of the California Achievement Test, the CAT, (Tiegs & Clark, 1970). Norms for the TABE are extrapolated from the norms developed for the CAT. The TABE was used in this study primarily because a committee of teachers and administrators from the Department of Corrections had selected it in the early years of the school district

for administration in all of the adult correctional centers. Therefore, teachers and principals were familiar with the test and its administration. Also, while reviewing several other achievement tests for adults, it was evident that the TABE's reliability and validity are comparable to or higher than those of most of the other tests available.

For the purpose of this study, the TABE M (the test of medium difficulty) was administered to all subjects at the beginning of their three month instructional cycle. The TABE M was selected because its scoring range is 3.0 to 10.0 grade equivalents, and this range is appropriate for pre-GED students. At the end of the three months' instructional period, the TABE D (D stands for difficult level) was administered as the post-test. The grade equivalency range of the TABE D is 5.0-12.9. The two levels of the TABE were used to have a low floor for the pretest and a high ceiling for the posttest. Pilot test data demonstrated that pre-GED students often bottomed out (at 5.0) if they were given a pretest on the TABE D, or topped out if they received the TABE M as a posttest. The lack of continuous raw score tables from the TABE M to the TABE D forced the norm-referenced total reading, math, and language analyses to be done in grade equivalents.

The TSCS. The Tennessee Self Concept Scale, the TSCS, (Fitts, 1965) was used to measure self-concept. Results will not be reported for this instrument because of a large number of problems encountered with the test. A discussion of these problems and suggestions for future research is presented later in the paper.

Results

To assess whether the incarcerated adult learners in the pre-GED program made significant ($p < .05$) gains in reading, mathematics, and

language development dependent t-tests were conducted on TABE exam scores collected before and after PLATO/CMI and traditional classroom instruction. Results of the 5-tests are presented in Table 2. Both instructional groups showed grade equivalent score gains in all three content areas. A gain of nine-tenths or nearly one grade level was achieved in reading by both instructional groups. The PLATO/CMI group doubled

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Insert Table 2

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the gain of the traditional group by achieving a gain of one versus one-half grade level on the mathematics exam, whereas both groups achieved a similar gain of approximately two grade levels on the language exam.

Step-wise multiple regression analyses were used to determine whether the learner's age, ethnicity, type of criminal sentence (1 = determinant, 2 = indeterminant) or prison security level (1 = medium, 2 = maximum) significantly ($p < .05$) predicted gains in the three content areas regardless of instructional method. Regression results presented in Table 3 indicated

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Insert Table 3

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that none of the demographic variables added significantly to the regression equations predicting reading and math scores after the respective preinstruction exam score was initially entered. The analysis of language scores, however, indicated that the age and Hispanic heritage of incarcerated adults significantly ($p < .01$) contributed to the prediction of TABE language scores. In general, younger adults outperformed older adults

and Hispanics had lower language scores than did either Blacks or Whites.

Discussion

It is important first to note that over half of the subjects were lost from the sample somewhere between pretests and posttests. There are several reasons for this high rate of attrition. A comparision of the turnover in the school and institutional populations during the 1981-1982 school year revealed that the inmate populations of the medium security facilities studied turned over completely two and a half times at the institutions with the traditional classrooms, and slightly more than twice at the institutions using PLATO/CMI. Turnover in the classrooms was comparable to institutional turnover. The traditional schools served over five and a half times their base school population during fiscal year 1981-82; the PLATO/CMI schools served a little less than three times their allocated number of students. School mobility is higher in the institutions with higher institutional mobility - they go hand in hand.

Special conditions existed at two PLATO sites which probably contributed to lower school mobility at those institutions. One PLATO site was a recently opened medium security institution which had low turnover. Few students were transferred from this institution because many of the students were new to the institution about the time the study began. Thus, students remained in this school much longer than students remained at the other medium security institutions. Also, at the maximum security PLATO site, during the second round of testing, there was a concerted effort to test all students who were still at the institution, even if the students had left school and gone on to other assignments. The lower attrition (from 42% down to 25%) at this institution, may be the results of this effort.

The loss of fifty-three per cent of the sample before the posttest is primarily a result of Department of Corrections' policy to, "move the inmates through the system," transferring them frequently from one insitution to another. Three months is a very short time for instruction to have an effect on student learning, particularly on remedial students; a six month testing cycle seems more reasonable. However, had the testing intervals been longer than three months, there would have been even fewer students for the posttests. This inmate mobility makes it very difficult to assess the effectiveness of the educational program.

Other than these documented differences, the selection and promotion procedures were the same at all institutions. Sixty-six per cent of the PLATO/CMI students remained to complete the three months' instruction, in comparison to only thirty-three per cent of the students in the traditional classrooms. While some could argue that PLATO may have motivated students to continue their education, more than did the traditional program, the data on overall school turnover, provided by the Deparment of Corrections suggest that the students in the contrast groups were simply unavailable for posttests - they had left the institutions and not simply dropped out of school. There was simply more movement from the institutions with traditional educational programs, though there is no simple explanation for these findings. Similar high attrition rates were reported by Murphy and Appel (1977) in their study of PLATO basic skills program participants in community colleges.

The statistically significant pretest to posttest gains in Basic Skills for both the PLATO/CMI and traditional groups is an encouraging demonstration of instructional effects for an adult population. The fact that the multiple regression analysis failed to predict achievement scores (except

for the Hispanic and older students in language) also demonstrates the complex instructional situation that exists with these students. There seems to be no simple way to predict which students will gain the most from either classroom or CMI instruction given information about the student's age, ethnicity, type of sentence, and the security level of their institution.

The patterns of the mean differences gained by the two groups of students are similar to gains in Basic Skills for much younger disadvantaged students cited elsewhere (Stebbins, St. Pierre, Proper, Anderson, & Cerva, 1977) as well as those reported for general tutoring (Cohen, Kulik, & Kulik, 1982). The discussion of language gains continues cautiously because of the small number of students tested in language, although pilot test data support these patterns in language, reading, and math. This study focused on reading and math gains, but the greatest gains for all students are in language. These high language gains for all students suggest particularly effective remedial language instruction in both the traditional and PLATO/CMI classes. These language gains may have been made because over two thirds of the language items on the posttest are derived from fairly straight forward rules and conventions for punctuation and capitalization. Therefore, these skills appear relatively easy to teach as demonstrated by this study and previous work (see Stebbins et al., 1977).

The next greatest gains were in math, and math is another relatively straight-forward basic skill with consistent rules. In addition to their online practice, the PLATO students received a great deal of pencil and paper practice on large numbers of offline worksheets. Therefore, the greater gains for the PLATO students may have resulted from the amount

of practice they received in math. Saracho (1982) raised the same issue when she discussed her findings. Her CAI subjects received classroom and CAI instruction, so she states, "It is possible that the results were not affected by the CAI itself but rather by extended practice," (p. 215-216). The math results found in this study may have come from the combined online and offline practice. Since no observations were done with these contrast groups, it is not possible to compare their respective amounts of practice.

The least gains for all students were made in reading comprehension, though the contrast group gained slightly more (3.1 months for every month of instruction) than the PLATO group (an even 3.0 months for every month of instruction). An earlier formative evaluation of the PLATO reading lessons by Alessi, Siegel, Silver, and Barnes (1982) showed positive effects for PLATO students in Information Finding and Paraphrasing with students assigned to reading, but not for PLATO students assigned to math. There was no difference found on criterion-referenced items dealing with Main Idea. These findings suggest that the PLATO students learned what they were taught, and that their gains were not simply attributable to instruction on PLATO. The Alessi et al. study reopens the case for content covered (Armbruster, Stevens, & Rosenshine, Note 4) which argues for test performance as an outcome of specific content covered. But, the Reading Comprehension items on the TABE go far beyond Information Finding and Paraphrase and it is understandable that all students showed less gain in this strand. Reading comprehension has long been recognized as a complicated outcome, one requiring vocabulary, background knowledge, and a host of other skills. Therefore, the gains

made suggest that if the PLATO curriculum were more comprehensive, the reading gains for the PLATO students might be greater.

The TSCS self-concept measure was administered in hopes that there would be changes in self-concept as students progressed through their respective educational programs. Despite the fact that this test was normed on deviant adult populations (including incarcerated persons), and has a low readability level (about 5.0), and an advertised short administration time, there were many problems encountered with the instrument. This is a difficult test to respond to because of its complicated layout (e.g. students respond to alternate items in a column, with items numbered nonsequentially). Many students refused to take the test because they felt the items were too personal, while other students took the test by constantly choosing the middle response category in the scale (the responses ranged on a five point continum from "most like me," to "least like me"). The test was also somewhat time consuming to administer and difficult to hand score. While it is worthwhile to attempt to measure gains in self-concept, similar administration problems may be observed with any such measure. It appears that incarcerated adults are hesitant to respond to personality issues as they are not certain who will be receiving the results and for what purpose.

Results of this study indicate that the incarcerated adults participating in either PLATO/CMI or tradition classrooms showed significant gains in Basic Skills instruction. Further research is needed to understand how and why the two instructional delivery systems worked. It would be particularly interesting to conduct an experimental study in an institution with low turnover in order to assess the impact of the two approaches under more controlled condtions. In such a study, it might even be possible to determine which method of instruction works best for which individual.

Table 1

Demographic Data of Study Participants

	PLATO/CMI (n=207)		Traditional (n=152)	
	Frequency	Per cent	Frequency	Per cent
Ethnicity				
Black	133	64.3	90	58.8
White	52	25.1	35	22.9
Hispanic	13	6.3	17	11.1
Unknown	9	4.3	11	7.2
Criminal Sentence				
Determinant	177	85.5	131	85.6
Indeterminant	16	7.7	14	9.2
Unknown	14	6.8	8	5.2
Prison Security Level				
Maximum	112	54.0	93	61.0
Medium	95	46.0	60	39.0
Age				
Average $\bar{x}$ = 25.0			$\bar{x}$ = 25.1	
Range 18-74			17-73	

Table 2

Pre-Post TABE Scores of Reading and Math and t-test Results

Group	TABE READING				TABE MATH				TABE LANGUAGE			
	Pre		Post		Pre		Post		Pre		Post	
	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
Traditional Classroom	7.2	1.55	8.1	1.94	7.1	1.15	7.6	1.60	5.5	1.69	7.9	2.96
	Gain = .9		(n = 53)		Gain = .5		(n = 53)		Gain = 2.4		(n = 11)	
	t = 3.42*				t = 2.57*				t = 5.48*			
PLATO/CMI	7.6	1.46	8.5	1.73	7.0	1.03	8.0	1.63	6.3	1.45	8.3	1.72
	Gain = .9		(n = 139)		Gain = 1.0		(n = 139)		Gain = 2.0		(n = 83)	
	t = 7.72*				t = 8.69*				t = 14.37*			

*p .01

Table 3

Regression Summary Tables (n=93)

Variable	F to enter	Multiple R	R^2
	Reading Scores		
Pre-instruction score	72.10**	.663	.44
Age	2.69	.675	.46
Prison security level	1.14	.680	.46
Ethnicity 3 (Hispanic)[1]	.49	.682	.47
Type of criminal sentence	.38	.684	.47
Ethnicity 1 (Black)	.25	.685	.47
Ethnicity 2 (White)	.06	.685	.47
	Math Scores		
Pre-instruction score	25.51**	.466	.22
Prison security level	2.11	.485	.24
Age	.70	.491	.24
Ethnicity 3 (White)	.38	.494	.24
Type of criminal sentence	.16	.495	.25
	Language Scores		
Pre-instruction score	97.43**	.727	.51
Ethnicity 3 (Hispanic)	6.41**	.739	.55
Age	6.54**	.760	.58
Ethnicity 2 (White)	1.39	.764	.58
Ethnicity 1 (Black)	2.76	.772	.60
Type of criminal sentence	.20	.773	.60
Prison security level	.11	.773	.60

[1]Dummy coding was used to designate the different ethnic groups.

**p .01

Notes

[1]The PLATO[R] sysem is a development of the University of Illinois. PLATO[R] is a service mark of Control Data Corporation.

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